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Repeat experiments as a tool for the analysis of solute transport parameter variability

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Modelling of longitudinal solute transport requires knowledge of the transport parameters involved. While in recent years notable progress has been made regarding the physical meaning of these parameters (Wörman et al., 2002, Salehin et al., 2003, Zaramella et al., 2006) they are still typically estimated from stream tracer experiments. The stream tracer experiments conducted for parameter estimation purposes are, however, almost invariably conducted at flow rates (and, possibly, stages of vegetation development) different from those characterizing an intended application. Clearly, more information (and insight) is needed on the transfer and scaling properties of solute transport parameters in fluvial systems at different flow rates.

This contribution suggests that 'repeat experiments', i.e. stream tracer experiments conducted at the same reach(es) at different times characterized by different flow rates and seasonal conditions may provide a valuable tool to analyse parameter variability and scaling properties of transport parameters.

As a pilot study in this context, data from 9 stream tracer experiments performed on the same channel reach of the Moedling brook (Lower Austria, south of the capital Vienna) over a period of 6 years have been used to find out, up to which ratio of respective flow rates transport parameter transfer will still yield acceptable accuracy of transient storage model predictions. The results of the study suggest that parameter transfer across a range of flow rates not exceeding a ratio of 1:2 will be associated with errors in peak concentrations below the 40% mark. Currently ongoing research aims at an enlargement of the data base, extension of the analysis to several successive

stream reaches and application of scaling strategies.

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